CLAIMS

1. A light-emitting device with an enlarged active light-emitting region, comprising:

a LED substrate;

an epitaxial layer, including a first material layer and a second material layer, wherein said first material layer is formed on the top surface of said LED substrate, and said second material layer is then formed on the top surface of said first material layer, a light-emitting region naturally included between said first material layer and said second material layer;

at least one first extended trench, allowed for passing through said second material layer and extending into a pat of said first material layer, a trench isolation layer and a first extended electrode being provided inside said first extended trench in turn, said first extended electrode and said second material layer being electrically isolated by said trench isolation layer;

a first electrode, securely provided on one part of top surface of said second material layer while separated from it by a surface isolation layer, and electrically connected to said first extended electrode; and

a second electrode, securely provided on the other part of top surface of said second material layer.

2. The light-emitting device according to Claim 1, wherein said first electrode and said second electrode are located in approximately horizontal levels.

3. The light-emitting device according to Claim 1, wherein said first extended electrode is located at a position vertically extending from said first electrode.

4. The light-emitting device according to Claim 1, wherein between said second electrode and said second material layer, there is further provided with what selected from the group consisting of a transparent contact layer, ohm contact layer, light-reflecting layer, and the combination thereof.

5. The light-emitting device according to Claim 1, wherein between said surface isolation layer and said second material layer, further provided with what selected from the group consisting of a transparent contact layer, ohm contact layer, light-reflecting layer, and the combination thereof.

6. The light-emitting device according to Claim 1, further comprising a substrate provided with a first electro-conductive layer and a second electro-conductive layer, respectively, on the top surface thereof, wherein said first electro-conductive layer is electrically connected to said first electrode by a first electro-conductive bump, and said second electro-conductive layer is electrically connected to said second electrode by a second electro-conductive bump.

7. The light-emitting device according to Claim 6, wherein said light-emitting

device is a flip chip light-emitting diode.

8. The light-emitting device according to Claim 6, wherein said substrate is made from what selected from the group consisting of a ceramics, glass, AlN, SiC, Al_2O_3, epoxy, urea resin, plastic, diamond, BeO, BN, circuit board, printed circuit board, PC board, metal-containing compound, and the combination thereof.

9. The light-emitting device according to Claim 1, wherein said light-emitting device is a flat light-emitting diode.

10. The light-emitting device according to Claim 1, wherein said LED substrate is selected from the group consisting of a GaP substrate, glass, sapphire, SiC, GaAsP, ZnSe, ZnS, ZnSSe, quartz, and the combination thereof.

11. The light-emitting device according to Claim 10, wherein said epitaxial layer is made from a material presented as a mode selected from the group consisting of a ternary mode, quaternary mode, and the combination thereof.

12. The light-emitting device according to Claim 1, further comprising a substrate having an accommodating trench chiseled therein for accommodating said light-emitting device, wherein said first electrode is electrically connected to a first electro-conductive line disposed on said substrate by a first electro-conductive lead, and said second electrode is electrically connected to a second electro-conductive line disposed on said substrate by a second electro-conductive lead.

13. The light-emitting device according to Claim 12, wherein within said accommodating trench, there is further provided with a transparent layer around the periphery of said light-emitting device.

14. The light-emitting device according to Claim 13, wherein within said transparent layer 94, further provided a color transformation layer made from what selected from the group consisting of fluorescent substance, phosphorescent substance, and the combination thereof.

15. The light-emitting device according to Claim 12, wherein within said accommodating trench, further provided with a heat-dissipating layer around the periphery of said light-emitting device.

16. The light-emitting device according to Claim 12, wherein said substrate is made from what selected from the group consisting of a ceramics, glass, AlN, SiC, Al_2O_3, epoxy, urea resin, plastic, diamond, BeO, BN, circuit board, printed circuit board, PC board, metal-containing compound, and the combination thereof.

17. The light-emitting device according to Claim 12, wherein said accommodating trench is presented as a mode selected from the group consisting of a taper, circle, and ring.

18. The light-emitting device according to Claim 12, wherein a light-reflective layer is further provided on the inner surface of said accommodating trench.

19. The light-emitting device according to Claim 1, wherein said first extended trench is provided around the periphery of said first electrode.

20. The light-emitting device according to Claim 19, wherein at least one first extended electrode is provided inside said first extended trench, each extended electrode electrically connected to said first electrode by means of a surface electrode disposed on the top surface of the former.

21. The light-emitting device according to Claim 20, wherein said first extended electrode is presented as a shape selected from the group consisting of a point, bar, ring, circle, rectangle, straight line, half-ring, and the combination thereof.

22. The light-emitting device according to Claim 1, wherein said first electrode and second electrode are allowed for covering a vertically extending position of the top surface of said second material layer as a whole, and made from an electro-conductive and light-reflective material, respectively.

23. The light-emitting device according to Claim 1, wherein said first extended trench is provided around the periphery of said second material and allowed for passing through a part of said first material layer, said trench isolation layer and said first extended electrode provided inside said first extended trench in turn.

24. The light-emitting device according to Claim 23, wherein said first extended electrode is a perimeter electrode.

25. The light-emitting device according to Claim 23, wherein a second extended trench is chiseled at said surface isolation layer so as to expose one part of top surface of said second material layer, and said second electrode is fixed inside said second extended trench and on the other part of top surface of said second material layer.

26. A light-emitting device with an enlarged active light-emitting region, the main structure thereof comprising:

a LED substrate;

an epitaxial layer, including a first material layer and a second material layer, wherein said first material layer is formed on the top surface of said LED substrate, and said second material layer is then formed on the top surface of said first material layer, a light-emitting region naturally included between said first material layer and said second material layer;

a second electrode, securely provided on one part of top surface of said second material layer;

a first electrode, securely provided on the other part of top surface of said second material layer;

at least one extended trench provided at said first electrode in proper place, each extended trench passing through said second material layer and a pat of said first material layer, at least one extended electrode electrically connected to said first

electrode being provided inside said extended trench; and

at least one isolation trench, provided between said first electrode and said second electrode, and allowed for passing through said second material layer and a part of said first material layer.

27. The light-emitting device according to Claim 26, wherein said first electrode and said second electrode are located in approximately horizontal levels.

28. The light-emitting device according to Claim 26, wherein between said first material layer and said first electrode, further provided with what selected from the group consisting of a transparent contact layer, ohm contact layer, light-reflective layer, and the combination thereof.

29. The light-emitting device according to Claim 26, further comprising a substrate provided with a first electro-conductive layer and a second electro-conductive layer, respectively, on the top surface thereof, wherein said first electro-conductive layer is electrically connected to said first electrode by a first electro-conductive bump, and said second electro-conductive layer is electrically connected to said second electrode by a second electro-conductive bump.

30. The light-emitting device according to Claim 29, wherein said substrate is made from what selected from the group consisting of a ceramics, glass, AlN, SiC, Al_2O_3, epoxy, urea resin, plastic, diamond, BeO, BN, circuit board, printed circuit board, PC board, metal-containing compound, and the combination thereof.

31. The light-emitting device according to Claim 29, wherein said light-emitting device is a flip chip light-emitting diode.

32. The light-emitting device according to Claim 26, further comprising a substrate having an accommodating trench chiseled therein for accommodating said light-emitting device, wherein said first electrode is electrically connected to a first electro-conductive line disposed on said substrate by means of a first electro-conductive lead, and said second electrode is electrically connected to a second electro-conductive line disposed on said substrate by means of a second electro-conductive lead.

33. The light-emitting device according to Claim 26, wherein said extended trench is presented as a shape selected from the group consisting of a point, bar, ring, circle, rectangle, straight line, half-ring, and the combination thereof.

34. The light-emitting device according to Claim 26, wherein an isolation layer is further provided inside said isolation trench.

35. The light-emitting device according to Claim 26, wherein said first electrode and second electrode are allowed for covering an overall top surface of said second material layer, and made from an electro-conductive and light-reflective material, respectively.

36. The light-emitting device according to Claim 26, wherein between said first material layer and said first electrode, further provided with what selected from the group consisting of a transparent contact layer, ohm contact layer, light-reflective layer, and the combination thereof.

37. The light-emitting device according to Claim 26, wherein said LED substrate is selected from the group consisting of a GaP substrate, glass, sapphire, SiC, GaAsP, ZnSe, ZnS, ZnSSe, quartz, and the combination thereof.

38. The light-emitting device according to Claim 37, wherein said epitaxial layer is made from a material presented as a mode selected from the group consisting of a ternary mode, quaternary mode, and the combination thereof.

39. The light-emitting device according to Claim 26, wherein said extended trench is provided around the periphery of said second material and allowed for passing through a part of said first material layer, said extended electrode being provided inside said extended trench in turn.

40. The light-emitting device according to Claim 39, wherein said extended electrode is a perimeter electrode.

41. The light-emitting device according to Claim 39, wherein a surface isolation layer is further provided on the surface of said second material layer, a second extended trench being chiseled at said surface isolation layer so as to expose one part of top surface of said second material layer, and said second electrode fixed inside said second extended trench and on the other part of top surface of said second material layer.